

Remarks/Arguments

Claims 1-12, 19 and 20 remain in the application.

Claims 13, 14 and 16 have been amended.

Claims 15, 17 and 18 have been cancelled.

Claim Rejections – 35 USC § 112

Claims 1-8 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

The Examiner has noted in the objection that applicant has stated “absent a series resistor” and has not described or enabled the “integrated circuit … absent a series resistor”. The Examiner has further stated it is well known in the art for circuitry components to be associated with series resistors and that said series resistors are an integral part of many disclosed circuits. Further the Examiner has noted that “a magnetometer coil devoid of series resistors: would be a distinct feature over the prior art.

Applicant notes that electronic circuits to supply current without a series resistor are known. Such circuits are generally considered a basic building block within analog circuits, as they are necessary for the design of digital-to-analog convertors, oscillators and phase locked loops (PLL). Applicant cites US 6,031,366; US 6,181,969; and US 6,331,830 as examples of transistor based current sources compatible with integrated circuit manufacturing. Applicant further notes cited use is as a periodic time-varying current signal, namely an oscillator. As such the applicant had deemed that the required functionality and circuits should be well known to those skilled in the art and not require explicit description.

Claim Rejections – 35 USC § 102

Claims 9-12 are rejected under 35 U.S.C. 102(b) as being anticipated by Kurihara et al. (US 5,757,184).

Applicant traverses this objection as follows: Kurihara teaches a magnetometer wherein the change in an external magnetic field is detected as a change in the inductance of the magnetometer. As taught by Kurihara it is only within the description of prior art that saturation of a magnetic core is discussed. There is no indication or statement in the teachings of Kurihara in respect of the invention disclosed in US 5,757,184 that the magnetic core is saturated, nor that the magnetic core is driven into saturation of both polarities as taught by the applicant.

Kurihara shows electronic circuitry specifically triggering at voltage levels of the output from the magnetometer. The pulse width of the pulse voltage signal indicates either the rise or fall time of the electric current and it is the phase difference of the electronic pulse from the applied time varying signal that provides Kurihara with the measurement of magnetic field. As such the applicant respectfully submits that the phase difference detector without magnetic saturation as disclosed by Kurihara is not the invention as disclosed by the applicant.

Claim 9 recites “determining a duty cycle associated with a first electromagnetic saturation of the core, and a second electromagnetic saturation of the core, the second electromagnetic saturation of the core having an opposite polarity to the first electromagnetic saturation.” Kuirhara teaches measuring rise and fall times of varying electrical voltage from core with predetermined voltage triggers.

Kurihara does not teach the electromagnetic saturation of the core, and does not teach determining a duty cycle for the transition between two electromagnetically saturated states of the core.. As such applicant traverses the objection.

Referring to claim 10 the applicant recites “using an integrated circuit, the integrated circuit provides a triangular output signal.” Kurihara teaches a time varying

voltage source and not a does not teach either a time varying applied current nor the use of an integrated circuit as source for the time varying signal. Therefore the use of a triangular current signal to a magnetometer is novel and applicant traverses the objection.

Claim 11 cites “the voltage potential is monitored using an integrated circuit”. Kurihara does not teach the detection of voltage potentials in respect to the saturated states of a magnetic core. As such applicant traverses the objection.

Now referring to claim 12 the applicant recites “the step of monitoring a voltage potential the voltage potential is monitored using the integrated circuit described in the step of using an integrated circuit.” Kurihara does not teach the use of an integrated circuit, and further Kurihara does not teach both the provision of current signals and measurement of voltage signals. As such applicant traverses the objection.

Claim Rejections – 35 USC § 102

Claims 13, 14 and 16-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Vernon et al. (US 6,268,725).

Applicant traverses the objection as follows: Vernon discloses a magnetometer for reducing the effects of electromagnetic interference. Vernon teaches the exploiting of magnetometer non-linearity and the use of harmonics of the drive signal to measure the magnetic field. Further Vernon teaches that the drive cycle has pseudo-randomly time variation such that the detection circuits are less sensitive to EMI at harmonics of the drive frequency.

As such the teaching of Vernon does not address the extraction of time information relating to the transitions of the core from one saturated electromagnetic state to another saturated electromagnetic state. Vernon clearly works upon the duty cycle becoming other than 50% in the presence of a magnetic field and as such shows clearly in the teachings the resulting output as a DC signal. The applicant cites the extraction of timing information and the use of differences in time duration as the means of deriving the magnetic field strength.

Applicant would respectfully submit that the pseudo-random nature of Vernon's drive signal renders time information meaningless. As such it is not obvious to one seeking time domain measurements of magnetic field to exploit the teachings of Vernon. Applicant traverses the objection but notes adjustment in claim language to clearly state the Applicant's invention.

Applicant refers Examiner to amended claims 14 and 16. As taught by Vernon the drive signal is one of variable frequency and the teachings relate to the generation of DC signal to provide measurement of magnetic field, said DC signal derived from the second harmonic of the variable frequency applied drive signal. As such Vernon teaches nothing in respect to a constant frequency applied signal and the extraction of magnetic field strength from the time domain measurement of the transitions of the core from one saturated electromagnetic state to another saturated electromagnetic state. As such applicant traverses the objection.

Claim 17 is cancelled.

Claim Rejections – 35 USC § 103

Claims 13, 14 and 16-20 are rejected under 35 U.S.C. 103 as being unpatentable over Kurihara et al (US 5,757,184) in view of Vernon et al. (US 6,268,725).

Referring to claims 13, 14 and 16 the applicant notes from supra that the only teaching by Kurihara in respect to the core having saturated electromagnetic states is briefly in respect of prior art which is dismissed as being difficult to reduce in size and lower in cost. Applicant acknowledges Examiners comments that Vernon does provide motivation to one ordinarily skilled in the art to overcome some limitations cited by Kurihara.

However applicant notes that Kurihara does not teach a time domain measurement of the transitions between one saturated electromagnetic state and a second saturated electromagnetic state for the measurement of magnetic field. Equally Vernon does not teach the time domain measurement. As such the combination of Kurihara and Vernon does not

teach one skilled in the art to measure the external magnetic field using time domain techniques. Applicant traverses the objection in respect to these claims.

Referring to claim 19 Kurihara teaches the use of three magnetometers. Kurihara only teaches that each of the magnetometers is mounted at 90° to each other. There is no consideration within Kurihara for the use of magnetometers in any other manner. Applicant traverses the objection.

Claim 20 cites “substantially non-zero angle relative to both the first coil and the second coil”. Applicant notes Kurihara teaches only magnetometers at 90° to each other and traverses the objection.

Claim Rejections – 35 USC § 103

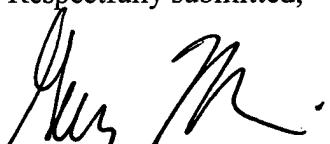
Claims 15 is rejected under 35 U.S.C. 103 as being unpatentable over Kurihara et al (US 5,757,184) in view of Vernon et al. (US 6,268,725) as applied to claim 13, and further in view of Kawahito et al..

Claim 15 is cancelled.

Please charge any additional fees required or credit any overpayment to Deposit Account No. 50-1142.

Applicant looks forward to receiving favourable reconsideration of the instant application.

Respectfully submitted,



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Date

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